



AMATEUR RADIO DIGITAL COMMUNICATIONS

44Net Everywhere

Zero Retries Digital Conference 2025 • Everett, WA

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AMATEUR RADIO DIGITAL COMMUNICATIONS

**or, Everything From
ARDC to ZRDC**

Here's what

- Operate an amateur station remotely
- Access your home network from anywhere in the world
- Host your own Internet services at home
- Build your own HAMNET-style wide-area network
- Learn by doing for learning's sake
- ???



Show of hands!

- Amateur Radio Digital Communications (ARDC)
- IPv4 addresses
- Why IPv4 addresses are important

A bit about ARDC



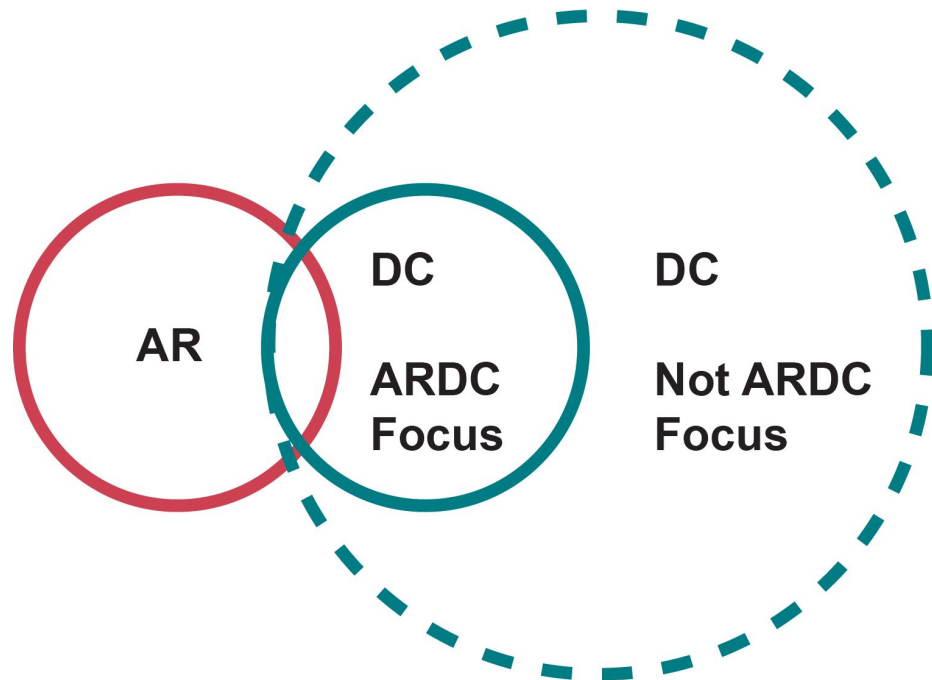
ARDC's mission

To support, promote, and enhance digital communication and broader communication science and technology,

... to promote Amateur Radio, scientific research, experimentation, education, development, open access,

... and innovation in information and communication technology.

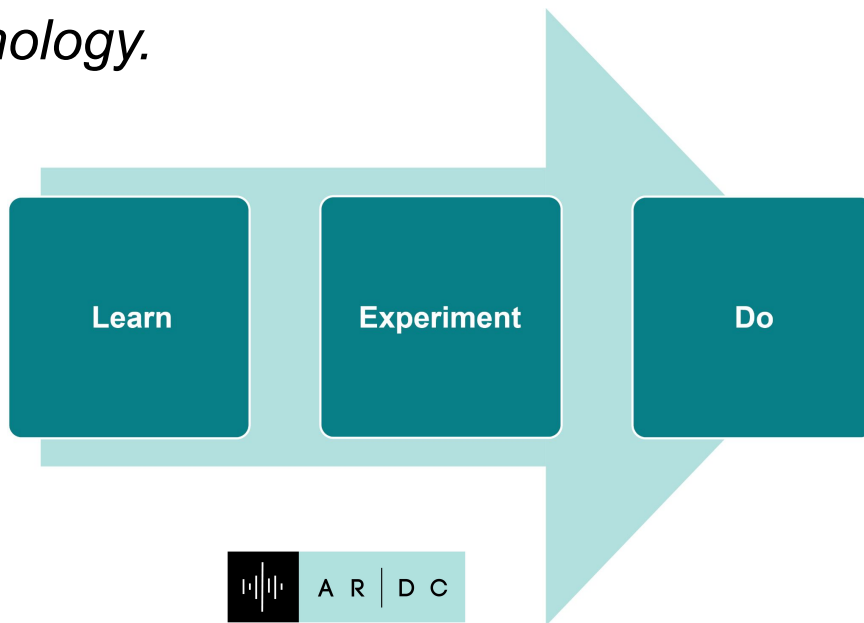
AR & DC



- Not merely amateur radio
- Not just any kind of digital communications
- Where the spirit of amateur radio and the practice of modern digital communications intersect

ARDC's vision

A thriving global community of learners, experimenters, and contributors advancing freedom with open source communication and information technology.



High-Level Strategies

Promote Learning

Goal: more people learning about AR and DC.

Promote Experimenting

Goal: more people experimenting, innovating, and developing new AR and DC technology.

Promote Doing

Goal: more people using additional and new bands, modes, & technologies (AR & DC).



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The Origins of 44Net

[RFC 790](#)

September 1981
Assigned Numbers

Network Numbers

036.r.r.r.r	SU-NET	Stanford University Ethernet	[MRC]
037.r.r.r.r	DECNET	Digital Equipment Network	[DRL]
038.r.r.r.r	DECNET-TEST	Test Digital Equipment Net	[DRL]
039.r.r.r.r	SRINET	SRI Local Network	[GEOF]
040.r.r.r.r	CISLNET	CISL Multics Network	[CH2]
041.r.r.r.r	BBN-LN-TEST	BBN Local Network Testbed	[KTP]
042.r.r.r.r	SINET	LLL-S1-NET	[EAK]
043.r.r.r.r	INTELPOST	COMSAT INTELPOST	[DLM1]
044.r.r.r.r	AMPRNET	Amature Radio Experiment Net	[HM]
044.r.r.r.r-126.r.r.r.r		Unassigned	[JBP]
127.r.r.r.r		Reserved	[JBP]



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16,777,216



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44/8



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44 Years of 44Net

1981	Hank Magnuski KA6M launches AMPRNet (now 44Net)
2011	Formation of ARDC by Brian Kantor WB6CYT (SK) to serve as trustee for the 44Net address space
2019	Sale of IPv4 addresses & creation of endowment to fund ARDC operations and grants
2020	Building full-time staff to manage operations, grants and technology development

30,989,984



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44 Years of 44Net

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2011	Formation of ARDC by Brian Kantor WB6CYT (SK) to serve as trustee for the 44Net address space
2019	Sale of IPv4 addresses & creation of endowment to fund ARDC operations and grants
2020	Building full-time staff to manage operations, grants and technology development
2025	Over \$30 million in non-profit grants made to date

12,582,912



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44/9

44.128/10



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44Net Portal

List IPv4 Networks

Expand All Contract All

- [44.0.0.0/9 - Bottom two thirds of ARDC address space](#)
- [44.0.0.1/32 - AMPRGW](#)
- [44.1.0.0/16 - ARDC Infrastructure](#)
- [44.2.0.0/16 - California_Central & Northern_etc](#)
- [44.3.0.0/17 - CISAR ITALY](#)
- [44.4.0.0/16 - San Francisco/Silicon Valley](#)
- [44.5.0.0/16 - SWEDEN](#)
- [44.6.0.0/16 - California:Santa Barbara/Ventura](#)

AMPRNet Logout

Maps Account Tickets DNS Networks Admin Statistics Superuser

Your call signs

Add a call sign

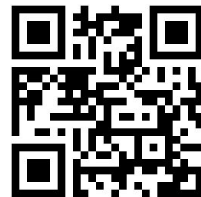
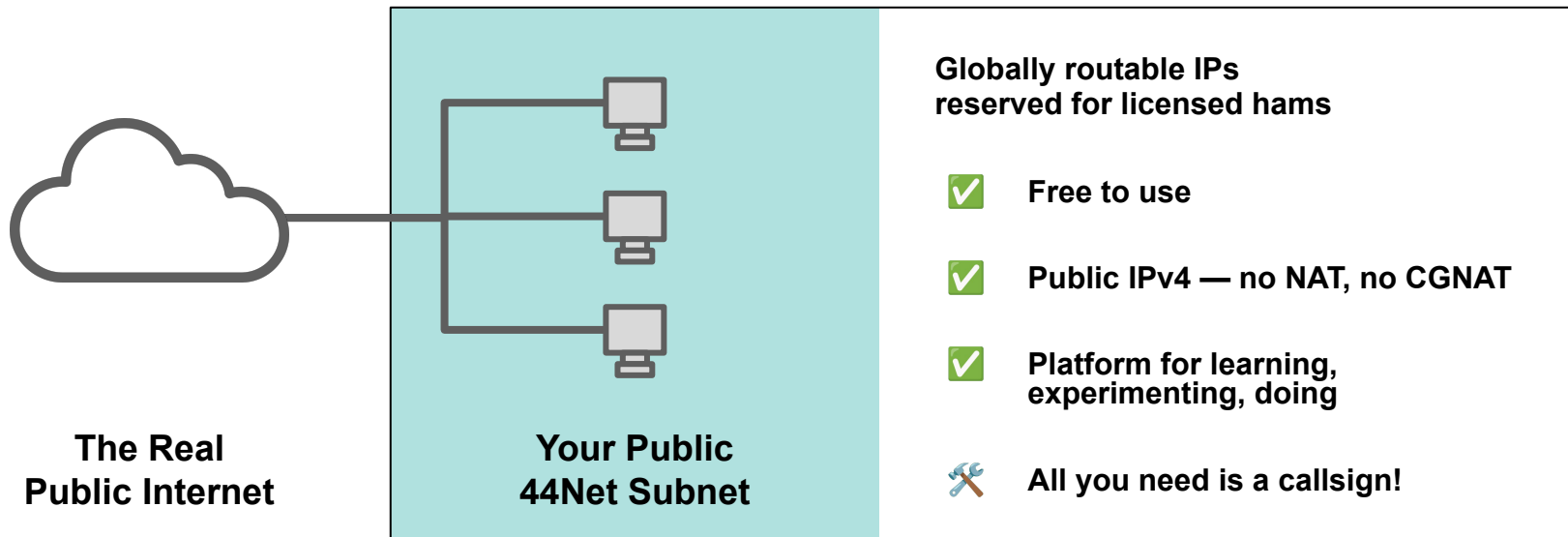
Call sign	Verified	Expires	Actions
N0GIS (Primary)	Mon, 07 Oct 2024	Mon, 08 Dec 2031	Verify Delete

If you are a licensed radio amateur you can enter your call sign (or call signs if you have more than one) here. If you want to request IP address assignments and obtain access to the DNS management features here, you need to verify at least one call sign.

portal.ampr.org



Real IPv4 for Real Hams



Here's what

- Operate an amateur station remotely
- Access your home network from anywhere in the world
- Host your own Internet services at home
- Build your own HAMNET-style wide-area network
- Learn by doing for learning's sake
- ???



BGP



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IPIP



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44Net's adoption problem

- 44Net provides public, static IPv4 addresses
- 44Net addresses require BGP announcement or IPIP tunnelling
- But BGP and IPIP^(*) require a static IPv4 address to route traffic to!

Enter WireGuard

- IPv4 / IPv6 VPN
- Cryptographically secure
- Easy to configure
- Free Software
- Clients on every platform
- UDP-based > NAT



wireguard.com



Your “Virtual Public Network”

- Your static 44Net IP points to a WireGuard VPN server
- Your WireGuard client connects to the VPN server
- You receive all traffic sent to that IP address over the VPN
- No matter where you actually are

44Net “Point of Presence” (PoP)

- ARDC hosts the WireGuard VPN server
- PoP dashboard assigns you a 44Net IP
- Generates your WireGuard config
- Copy / paste / scan into any WireGuard client
- **Now you have a free, static, public IPv4 address!**



44net Cloud

HomeResources ▾

schuyler@ardc.netLogout

Request

Select from one of the available network interfaces.

Canada - East

Vultr - Toronto, Ontario

toronto / public

Wireguard

44.33.192.0/24

Central US

Vultr - Dallas, TX

dallas / public

Wireguard

44.33.7.0/24

Europe

Vultr - Frankfurt, Germany

frankfurt / public_2

Wireguard

44.33.3.128/25

44net Cloud

HomeResources ▾

schuyler@ardc.netLogout

Request: public

toronto / public

Wireguard

44.33.192.0/24

Configuration

Provide the information for us to configure your tunnel.

Name

Give your tunnel a name to help you identify it.

Public Key (optional)

If you do not provide a public key, we will generate one.

Preshared Key (optional)

A preshared key offers an added layer of protection.

☐ Send tunnel details by email (optional)

If selected, your tunnel details will be sent to you by email.

Routing (optional)

Route additional networks over this tunnel, for use on your local network.

Routing Protocol (optional)

None

Add

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HomeResources

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Your Configuration

Name

Test Tunnel

Type

Wireguard

Private Key

— Keep this in a secure place, as it cannot be shown to you again

607zoyzVfAT0GTzj2xDwVlXaGwTroJtG6f0fpeRZHU=

Public Key

SZKhlnJnXVQ9fA+ZU0o/
G2zAeUr40i1ZmtGLwxIqhII=

Networks

fe80::3da4:635c:2b50:77e2/128
44.33.192.18/32

Server Configuration

Name

toronto / public

Type

Wireguard

Public Key

0Wi9YapVGjicBj3eAs1TSyJSXvP6xeYKHp+X5F5KbHs=

Port

44000

Access

216.128.179.25

Addresses

fe80::3c36:63db:62bc:12d0/64
44.33.192.1/24

Configuration

Some example configurations to help get you started!

QRCode

wg-quick

[Interface]

PrivateKey = 607[REDACTED]U=

Address = fe80::3da4:635c:2b50:77e2/64, 44.33.192.18/24

DNS = 1.1.1.1,1.0.0.1

[Peer]

PublicKey = 0Wi9YapVGjicBj3eAs1TSyJSXvP6xeYKHp+X5F5KbHs=

Endpoint = 216.128.179.25:44000

PersistentKeepalive = 20

AllowedIPs = 0.0.0.0/0, ::/0

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HomeResources

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Configuration

Some example configurations to help get you started!

QRCode

wg-quick

This QRCode can be used to configure the WireGuard mobile applications on iOS and Android.



Copy-'n-paste configuration

[Interface]

PrivateKey = 607[REDACTED]HU=

Address = fe80::3da4:635c:2b50:77e2/64, 44.33.192.18/24

DNS = 1.1.1.1,1.0.0.1

[Peer]

PublicKey = 0Wi9YapVGjic8j3eAs1TSyJSXvP6xeYKHp+X5F5KbHs=

Endpoint = 216.128.179.25:44000

PersistentKeepalive = 20

AllowedIPs = 0.0.0.0/0, ::/0



WireGuard is supported on...

- Windows, MacOS, Linux
- Android, iOS
- DD-WRT, OpenWRT
- Asus, TP-Link, GL.iNet, Mikrotik, *inter alia*



Some details and caveats

- <https://dashboard.44net.cloud/>
- Still in beta tho
- Free Software – patches welcome
- Not for “production” traffic
- Never for commercial use



IPv4 addresses which are:

- Static
- Publicly addressable
- Globally routable
- Easy to request and configure
- Free to any ham with a current license!



**Right now, some of you are
really excited...**

**And some of you are
thinking “so what?”**



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Here's what

- Operate an amateur station remotely
- Access your home network
- Host your own Internet services
- Build your own HAMNET-style WAN
- Learn by doing for learning's sake
- Contribute to the 44Net PoP project
- ???



Here's why

Same as why do ham radio:

- Learning about science and technology
- Building things to see how they work
- Doing social activities with like-minded folks
- Looking for ways to serve our communities
- Maybe some or all of the above



Join us!

Experiment with a 44Net IP address!

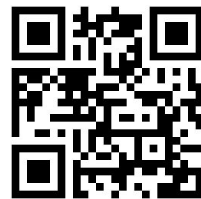
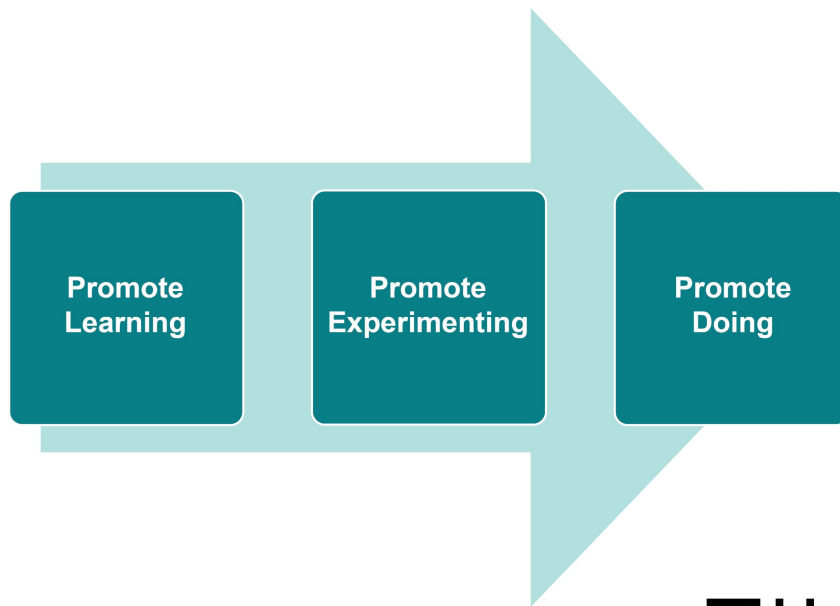
👉 **dashboard.44net.cloud**

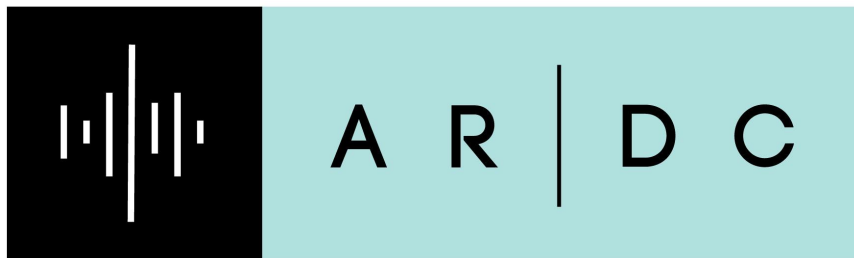
Learn and **Do** more with 44Net!

👉 **ampr.org**

Apply for a grant!

👉 **grants.ardc.net**





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Thank you!

Reach out any time: contact@ardc.net

